I Claim:

1. An apparatus for the separation of waste constituents from matrices, comprising: a vessel having a top, said top having a manifold for removal of gases; a bottom; and a means for heating interior of said vessel.

2. The apparatus of claim 1 further comprising a means for generating a vacuum for withdrawing gases through said manifold.

3. The apparatus of claim 2 further comprising a removable tray.

4. The apparatus of claim 3 wherein said vessel further comprises 0 to 4 sides.

5. The apparatus of claim 4 wherein said vessel has 0 sides and the tray effectively forms the sides of the vessel upon insertion into said vessel.

6. The apparatus of claim 3 wherein said tray comprises a bottom having orifices, said bottom capable of supporting matrices and allowing air to pass upwardly through matrices and orifices.

7. The apparatus of claim 6 wherein said bottom is a screen.

8. The apparatus of claim 6 wherein said bottom is slotted.

9. The apparatus of claim 3 wherein said tray is of size, dimension and capacity so that it can be moved and loaded into vessel with a fork truck.

10. The apparatus of claim 3 wherein said tray is loaded with matrices from top and has a loading capacity of at least about 2.5 cubic yards.

11. The apparatus of claim 3 wherein said tray has a hinged gate at opposite end of fork lift pockets for unloading treated matrix.

12. The apparatus of claim 1 further comprising a means for mechanically agitating matrices.

13. The apparatus of claim 1 further comprising a means for the introduction of chemical treatment additives.

14. The apparatus of claim 1 wherein bottom surface of manifold comprises a high temperature silicon or other heat resistant gasket to seal tray to manifold so that air is substantially directed through trays and matrices contained in tray and not around tray.

15. The apparatus of claim 1 wherein said manifold contains a 1 to 100 micron dry filter media physically separating matrix particulates entrained in the purge gas air stream.

16. The apparatus of claim 1 further comprising a means for remotely monitoring operation of said apparatus using a controller system and transducers to convey information to a computer.

17. The apparatus of claim 3 comprising between 1 and 4 trays.

18. The apparatus of claim 1 wherein said apparatus is permanently mounted or mobile.

19. The apparatus of claim 1 wherein said top can be moved vertically.

20. A method for the separation of hazardous and non-hazardous organic and inorganic waste constituents from matrices comprising: placing matrices in a container; heating matrices; creating a subatmospheric pressure within the matrices by establishing a vacuum above the matrices; and removing the gaseous constituents from the matrices.

21. The method of claim 20 herein said matrices are selected from radioactive materials, industrial process waste streams, soils, sludges, activated carbon, catalyst, aggregates, biomass, debris, sorbents, drilling mud and drill cuttings.

22. The method of claim 20 wherein boiling points of said constituents range from about 30 degrees Fahrenheit to about 1600 degrees Fahrenheit.

23. The method of claim 20 wherein said constituents are selected from ammonia, mercury, mercuric compounds, cyanide, cyanide compounds, arsenic, arsenic compounds, selenium, selenium compounds, and other metals and their salts.

24. The method of claim 20 further comprising the separation of constituents from matrices in which constituents are not thermally destroyed or combusted.

25. The method of claim 20 further comprising reversibly phase changing constituents separated from matrix by condensation of or physical filtration or adsorption of constituents.

26. The method of claim 20 wherein constituents are retained in matrices for less than 0.5 seconds after desorption temperature of constituents has been achieved.

27. The method of claim 20 further comprising heating matrices in an indirect manner by exposure to light energy with an emission spectrum between 0.2 to 14 microns.

28. The method of claim 20 wherein the surface of matrices exposed to infrared energy becomes secondary emitter and purge air convectively transfers heat to matrix surface of loaded tray.

29. The method of claim 20 wherein surface of matrices exposed to light energy becomes emitter and transfers heat conductively to matrix layers above surfaces exposed to light energy.

30. The method of claim 20 wherein matrices heated by convective means conducts heat to matrix layers above surface of matrix.

31. The method of claim 20 further comprising separating organic chemicals from matrices containing radionuclides and inorganic metallic constituents.

32. The method of claim 20 wherein said vacuum ranges from 0 inches mercury to about 29 inches mercury.

33. The method of claim 20 further comprising means for recovery of constituents which can be refined for recycling purposes.

34. The method of claim 20 further comprising means for purging gas vapors and constituents to be condensed and collected.

35. The method of claim 20 wherein discharge air stream is recirculated below trays to form a substantially closed loop system.